Internal Letter

North American Rockwell

Date March 26, 1974

No

TO W. F. Heine/V. J. Schaubert (3)

FROM D. C. Campbell

Address D/731-150 T020

Phone

Subject SNAP Hydriding Experiments - T020

Background

Prior to hydriding, the U-Zr fuel for SNAP is in the form of a solid solution. During hydriding, the uranium is precipitated from the solid solution in the form of approximately one micron diameter particles. It has been theorized that an increase in the uranium particle size could significantly reduce the irradiation damage to the zirconium hydride matrix.

A series of seven (7) developmental hydriding runs will be performed in T020 to evaluate the effects of processing variations on uranium particle size. Enriched uranium-zirconium fuel slugs, ~.55 in. dia. x ~4 in. long, will be used for this program (rods are 10.5 w/o U, 93% enriched).

1.0 Process Description

1.1 Transfer (2) enriched U-Zr fuel rods from SS Vault to T020.

1.2 Move the (2) rods into the Hot Shop, Room 139.

1.3 Weigh each rod and record.
Note: Each rod will weigh a nominal 600 gms and contain 63 gms U, or 59 gms Ux.

1.4 Using a lathe, each rod will be cut into (4) equal segments while retaining an ~1/4 in. thick sample from the center of each rod.

1.5 Each segment will be identified, using a metal stamp, with the original rod number and a sub-number.
Note: Each segment will weigh a nominal 150 gms and contain ~16 gm U, or 15 gms Ux.

1.6 About 0.050 in. of material will be removed from the O.D. of each slug and the ends will be chamfered.
Note: Each slug will weigh ~125 gms and contain ~13 gm U, or 12 gms Ux.

1.7 The slugs will be transferred to the Hot Laboratory, Room 141.

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1.8 The slugs will be U/S cleaned, weighed and the data recorded. Random measurements will be taken on the fuel slug O.D. and length.

1.9 Fuel slugs will be ~~stored~~ in Room ~~141~~ ~~awaiting~~ hydriding.

1.10 One slug at a time will be suitably wrapped and moved to the hydriding operation in the operating gallery.

1.11 Accurate slug weights will be taken on a balance in the Cold Lab adjacent to Cell No. 1.

1.12 One slug at a time will be placed inside a ceramic tube and loaded into the hydriding furnace. A cycle will normally run from Monday Friday.

1.13 Upon completion of the run, the fuel slug will be removed, weighed, wrapped and transferred to Room 141.

1.14 In Room 141, met samples will be prepared and evaluated.

1.12 Upon completion of the program fuel slugs, met samples and turnings will be returned to the SS Vault.

2.0 Facility Description

2.1 The work will be performed in T020, Rooms 139, 141 and the operating gallery.

3.0 Facility and Process Safeguards

3.1 All operators will be required to wear film bages. In addition, protective clothing is required for operations in Rooms 139 and 141.

3.2 Temporary exhaust ducting will be utilized over the lathe to the R/A exhaust system.

3.3 All lathe operations will use a coolant.

3.4 Lathe turnings will be temporarily stored in a container under oil. Upon completion, the turnings will be cleaned, dried and stored in a purged and sealed can for transfer to the SS Vault.

3.5 All handling of fuel material will be done using gloves.

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4.0 Operator Qualifications

4.1 Work will be performed under direction of D. C. Campbell.

4.2 All operating personnel have 1 year minimum training.

5.0 Criticality Considerations

5.1 [redacted] other [redacted] uranium will be in T020 during this program.

5.2 The maximum quantity of U_{235} involved in this effort is 120 gms which is less than the 350 gms of U_{235} which is safe under all conditions.

6.0 Records

6.1 [redacted] cessing data will be recorded in lab notebooks.

6.2 S[redacted] records will be maintained in accordance with SOP K-16 and the Nuclear Materials Management Procedures Manual.

Verbal approval of the above procedure is requested in order to complete the program prior to June 30, 1974.

D. C. Campbell,
Manager
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